

**Amendments to the Claims:**

Please amend Claims 1-12 and cancel Claims 13-53 as indicated in the following listing of claims, which replaces all prior versions and listings of claims in the application.

**Listing of Claims:**

1. (Currently Amended) A microfluidic ~~microfluidic~~ device comprising:  
a microfluidic flow channel formed in a first layer;  
a first microfluidic control channel formed in a second layer adjacent to the first layer, the first microfluidic control channel separated from the microfluidic flow channel by a first deflectable membrane; and  
a second microfluidic control channel adjacent to the first microfluidic control channel and separated from the first microfluidic control channel by a second deflectable membrane.
2. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 1 wherein the first layer underlies the second layer.
3. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 1 wherein the first layer overlies the second layer.
4. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 1 wherein the second microfluidic control channel is formed in the first layer and does not intersect with the microfluidic flow channel.
5. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 1 wherein the second microfluidic control channel is formed in a third layer adjacent to the second layer.
6. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 1 wherein:  
the first microfluidic flow channel comprises a network of flow channels;

the first microfluidic control channel comprises a branched network of channels sharing a common inlet and having widened portions; and

the second microfluidic control channel comprises a network of channels having separate inlets and also having widened portions.

7. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 6 wherein:  
a number of branches of the first control channel network equals a number of the flow channels, each first control channel branch including only one widened portion at a corresponding flow channel branch; and

the channels of the second control channel network are arranged in a multiplexor configuration, thereby defining an inverse multiplexor structure.

8. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 6 wherein:  
a number of branches of the first control channel network is fewer than a number of the flow channels and have widened portions arranged in a first multiplexor configuration; and  
a number of channels of the second control channel network is fewer than a number of the flow channels and have widened portions arranged in a second multiplexor configuration, thereby defining a cascaded multiplexor structure.

9. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 6 wherein at least one of the first control channel network and the second control channel network comprise a first stage having at least  $x \log x$  control channels, where  $n$  is the number of flow channels and  $x$  is an integer greater than 2.

10. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 9 wherein the at least one of the first control channel network and the second control channel network further comprises a second stage having at least  $x \log x$  control channels, where  $n$  is the number of flow channels and  $x$  is an integer greater than 1.

11. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 1 further comprising a third microfluidic control channel adjacent to the second microfluidic control

channel and separated from the second microfluidic control channel by a third deflectable membrane.

12. (Currently Amended) The microfluidic ~~microfluidic~~ device of claim 11 wherein:
- the first microfluidic flow channel comprises a network of flow channels;
  - the first microfluidic control channel comprises a first branched network of channels sharing a first common inlet and having widened portions;
  - the second microfluidic control channel comprises a second branched network of channels sharing a second common inlet and also having widened portions; and
  - the third microfluidic control channel comprises a network of channels having separate inlets and also having widened portions.

13–53. (Cancelled)